Physics 129: Problem Set #8

Due: Fri Nov 2 at 5PM

Homework Box available on 2nd Floor LeConte breezeway

1. Draw a Feynman diagram involving a W boson for each of the following processes:

   (a) $\tau^+ \to e^+ + \nu_e + \overline{\nu}_\tau$

   (b) $K^0 \to \pi^- + e^+ + \nu_e$

   (c) $D^+ \to \overline{K^0} + \mu^+ + \nu_\mu$

   (d) $\tau^+ \to \nu_\tau + \pi^+$

   (e) $\Lambda \to p + e^- + \overline{\nu}_e$

   (f) $\nu_e + e^- \to \nu_e + e^-$

2. For each of the weak interations listed below replace the unknown X with the appropriate particle:

   (a) $\pi^+ \to \pi^0 + e^+ + X$

   (b) $X \to e^+ \nu_e \overline{\nu}_\mu$

   (c) $K^+ \to X e^+ \nu_e$

   (d) $X + p \to n + e^+$

   (e) $D^0 \to K^- + \pi^0 + \nu_e + X$

3. Perkins 7.1

4. Perkins 7.3

5. Perkins 7.7

6. Estimate the relative rates for the following four decay modes of the $D^0(c\overline{u})$ meson: $D^0 \to K^-\pi^+$, $D^0 \to \pi^-\pi^+$, $D^0 \to K^+\pi^-$, $D^0 \to \pi^0\pi^0$. As part of your answer, draw Feynman diagrams involving W bosons for each decay.